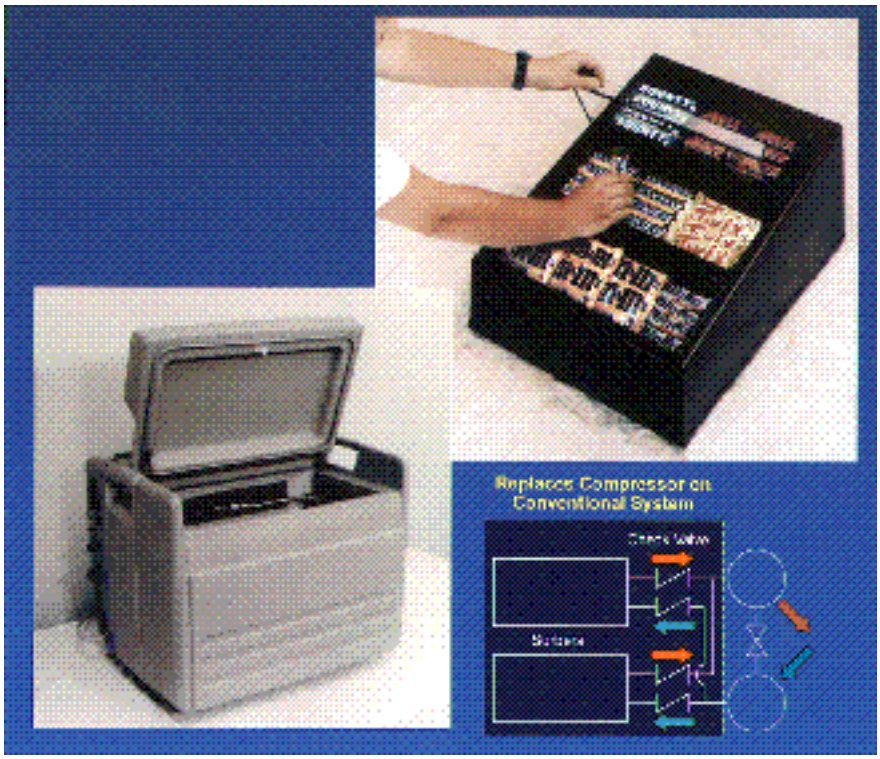
ELECTRONICS COOLING TECHNOLOGY HAS DUAL USE APPLICATIONS



Payoff

Technology employed in the design of a new adsorption-based refrigeration system to cool high heat flux electronics in electronically intensive aircraft and mobile military vehicles has spun-off into the development of several commercial product prototypes. This has included a point-of-sale candy bar freezer, a hotel room refrigerator/freezer and a portable freezer. Additional potential commercial applications of the technology include utilization of an adsorption heating and cooling system to increase the range of electric vehicles and reducing auto emissions through catalytic converter preheating on conventional vehicles.

Accomplishment

Under a program sponsored by the Propulsion Directorate's Aerospace Power Division, Rocky Research Inc. developed an adsorption-based refrigeration system that works off the heats of adsorption and desorption of ammonia and a solid salt. It can be scaled down to sizes that are appropriate for portable military and commercial applications without any loss in efficiency.

Background

The miniaturization of conventional vapor-compression refrigeration systems is limited by the tolerances that can be reasonably obtained in the manufacture of the compressors or pumps. In contrast, the new adsorption refrigeration system has no compressor or other moving parts and thus has no critical machining tolerances that inhibit it from being scaled down in size. Its operation is similar to natural gas powered a*b*sorption refrigerators that work off the heats of a*b*sorption and desorption of two liquid constituents that are typically ammonia and water or lithium bromide and water. However, it is the difference in constituents used in the Rocky Research system that makes it more appropriate for aircraft applications where variable orientations to ground would cause undesired migration of fluids. Since this refrigeration system may be powered by heat energy as well as primary electrical power, aircraft engine exhaust heat could be used to operate the device. Another advantage of adsorption refrigeration systems is their inherent storage capability. This capability enables this type of system to be started instantaneously and operated for a period of time without any energy input. It is a feature that is especially attractive for chemical warfare suit cooling and electric vehicle heating and air conditioning.